



**CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY  
DEPARTMENT OF TOXIC SUBSTANCES CONTROL  
Notice of Intent to Certify  
Hazardous Waste Environmental Technologies**

The California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) intends to certify the following company's hazardous waste environmental technology listed below:

Applicant: U.S. Army Environmental Center, SFIM-AEC-ETD, Bldg. 4430,  
Aberdeen Proving Ground, MD 21010-5401  
Technology: SCAPS Thermal Desorption Sampler

Health and Safety Code, section 25200.1.5, authorizes DTSC to certify the performance of hazardous waste environmental technologies. The purpose of the certification program is to provide an in-depth, independent review of technologies to facilitate regulatory and end-user acceptance. Only technologies that are determined to not pose a significant potential hazard to the public health and safety or to the environment when used under specified operating conditions may be certified.

DTSC makes no express or implied warranties as to the performance of the manufacturer's product or equipment. The end-user is solely responsible for complying with all applicable federal, state, and local regulatory requirements. Certification does not limit DTSC's authority to take any action necessary for protection of public health and the environment.

By accepting certification, the manufacturer assumes, for the duration of certification, responsibility for maintaining the quality of the manufactured equipment and materials at a level equal to or better than was provided to obtain certification and agrees to be subject to quality monitoring by DTSC as required by the statute under which certification is granted.

DTSC's proposed decision to certify is subject to public review and comment. Written comments must be received by DTSC no later than 30 days after publication of this notice. All comments will be considered and appropriate changes will be made prior to publishing DTSC's final decision.

Additional information supporting DTSC's proposed decision, including the June 2000 Draft Certification Evaluation Report, is available for review at, and comments should be mailed to:

California Environmental Protection Agency  
Department of Toxic Substances Control  
Office of Pollution Prevention and Technology Development  
P.O. Box 806  
301 Capitol Mall, 1st Floor  
Sacramento, California 95812-0806  
Attn: Mr. John Wesnousky (916) 322-2543

A description of the technology to be certified, the proposed certification statement, and the certification limitations and conditions follows. DTSC emphasizes that this is a proposed certification for public comment, and not the final certification.

30-DAY PUBLIC NOTICE  
HAZARDOUS WASTE ENVIRONMENTAL  
TECHNOLOGIES  
PROPOSED  
TECHNOLOGY CERTIFICATION

**Technology:** SCAPS Thermal Desorption Sampler  
**Applicant:** U.S. Army Environmental Center,  
SFIM-AEC-ETD, Bldg. 4430,  
Aberdeen Proving Ground, MD 21010-5401

### **Background**

The Site Characterization and Analysis Penetrometer System (SCAPS) Thermal Desorption Sampler (TDS) is a near real-time in-situ subsurface screening method for volatile organic compounds (VOCs). The technology was developed by the U.S. Army Engineer Research and Development Center, Waterways Experiment Station through the Tri-Service SCAPS program and is one of a planned family of sensors collectively called the Site Characterization and Analysis Penetrometer System, or SCAPS, that will combine remote sensors with a cone penetrometer platform to provide rapid, in-situ, subsurface measurements of many different contaminants.

The conventional or traditional approach to site characterization, which depends on collection of discrete soil and water samples followed by laboratory analyses, is usually a slow, iterative, and costly process. Significant delays occur in site characterization while samples are analyzed. Subsequent sampling borings are completed with no knowledge of the results from other boring locations, or the process must stop to await results from previous sampling. The SCAPS TDS technology was designed to improve upon conventional site characterization by providing rapid qualitative to semi-quantitative information about the subsurface distribution of volatile organic contamination.

### **Technology Description**

The SCAPS TDS technology was developed for deployment with a standard cone penetrometer to provide near real-time semi-quantitative field screening analyses of volatile organic compounds (VOCs) in the vadose and capillary zones. In operation, the SCAPS TDS probe is pushed to a desired depth, an interior rod retracts the penetrometer tip, and a known volume of soil is collected in the sample chamber. The sample chamber is heated in-situ and purged with helium carrier gas to desorb the VOCs. The desorbed VOCs are transferred to the surface through an umbilical threaded through the cone penetrometer push rods. The VOCs are concentrated onto a sorbent trap for subsequent analysis by an ion-trap mass spectrometer on board the SCAPS truck. After desorption,

the soil sample is expelled and the cone penetrometer is pushed to a new depth where the sampling process is repeated. The SCAPS TDS technology consists of two primary components: (1) the Thermal Desorption Probe and associated sample collection equipment deployed with a cone penetrometer, and (2) an on-board ion-trap mass spectrometer (ITMS) and associated equipment for near real-time analysis of the samples collected on sorbent traps. A detailed description of the system components follows.

The cone penetrometer (CP) platform used to deploy the Thermal Desorption Sampler houses all associated sample collection and analytical instruments. Typically, the CP is housed in a 20-ton truck; 20 tons is thus the static reaction force that the weight of the truck can exert on the pushrod of the CP. Within the truck, the CP and the on-board analytical system with computers are housed in separate compartments. The CP pushrod is composed of detachable 1-meter (m) long tubular sections which thread together one-by-one to lengthen the pushrod as it is advanced into the ground with a hydraulic ram against the weight of the truck. Typically, the CP sensors are advanced by attaching successive lengths of pushrod in 1-m lengths at a rate of up to 1 m per minute to a potential maximum depth (at present) of 50 m (. 150 ft). Umbilical cable, containing the wires and tubes needed to control and operate the TDS probe, is threaded through the pushrods prior to deployment of the technology. The maximum depth of operation is governed by site-specific stratigraphy and the method is limited to sites where the cone penetrometer can be pushed to the depth of concern, through primarily unconsolidated sedimentary deposits or formations.

As the pushrod is withdrawn at the end of each push, the tube sections are steam-cleaned before being disconnected for storage. After all of the push rods are withdrawn from the ground, the push hole is grouted from the bottom up by lowering a 3/4-inch PVC tremie pipe to the bottom of the push hole and pouring a cement bentonite slurry through the tremie pipe as it is being gradually withdrawn.

The TDS principle of operation involves thermally desorbing VOCs from a known soil volume in-situ. The probe design is a series of steel cylinders with gas channels and piston chambers made tight by o-rings. A central actuator rod is held in place by locking lugs in the closed position while the probe is being pushed into the ground. Once the probe reaches sampling depth, the locking lugs are pneumatically released and the piston is retracted to open the sample chamber. At sampling depth, the probe is pushed an additional 1.75-2 inches to sample a soil plug of known diameter and estimated volume. Depending upon soil density, the plug weight ranges from 3.5 to 5.0 grams. A push of 1.9 inches results in a soil sample plug approximately 1 inch long in the sample chamber. The chamber is heated by a nichrome-wire-wrapped ceramic heater fitted with an inner stainless steel protective sleeve and a thermocouple to monitor temperature. The temperature of the ceramic heater can be controlled to stabilize and maintain specified soil temperatures in the sample chamber. Soil temperatures during sampling are maintained between 150 to 200EC, depending on the soil conditions and contaminants present at the site. Helium is introduced through stainless-steel tubing located along the inner wall of the outer housing at a rate of 50 milliliters/minute. The gas enters the sample chamber area from behind and below. It is preheated to temperatures between 170 and 200EC as it moves across the surface of the heater before sweeping upward over the soil plug to purge the VOCs as they are volatilized into the chamber. The gas carries the volatilized sample up through the analyte line and into the sample collection device at the surface. Once the soil has been desorbed, the plug is ejected by forcing a burst of high-pressure gas down the line while lowering the actuator rod. A sensor in the probe indicates the rod's position to the operator at the surface.

After the spent soil is ejected and the actuator rod is locked in the closed position, the TDS is pushed to a new depth and the sampling process is repeated. Sampling times generally vary between 15 and 30 minutes depending on soil type and moisture content. Sequential sampling with the SCAPS TDS can provide a vertical spatial resolution of approximately 6 inches. This resolution is limited by potential for physical and thermal disturbances caused by the previous sampling event with the TDS probe.

The TDS probe is linked to a manifold system housed in the SCAPS truck at the surface by a 200-foot umbilical threaded through the 1-meter sections of push rods. Gas flows, temperature, and position of the actuator rod are controlled and monitored at the surface through the manifold system. Digital mass flow meters are used to control carrier gas flows into and from the probe sample chamber to prevent sample losses and to ensure that soil gas outside the sample chamber is not introduced into the sampling process. The volatilized sample is collected on a sorbent trap attached to the manifold inside the SCAPS truck prior to analysis by ITMS.

The on-board ITMS is comprised of a quadrupole ion-trap mass spectrometer, a capillary restrictor interface, and a sample inlet designed for use with the TDS for on-site measurement and monitoring. Analysis of the TDS samples concentrated on sorbent traps is performed with the use of a Teledyne 3DQ ITMS or Finnigan ITMS 40 operating in the electron impact mode or chemical ionization mode. An OI Analytical model 4560 purge-and-trap sample concentrator that has been modified for use with the TDS is used as the sample introduction device. Unlike most mass spectrometry systems, the analyte vapors purged from the sorbent trap are directly subject to mass spectrometry without prior separation. Therefore, analyte identification is performed entirely by means of mass ion identification. Analytes with the same quantitation mass ions cannot be distinguished from each other and are reported as totals similarly to analytes co-eluting in GC techniques.

Since the ITMS does not have a separation mechanism other than the mass spectrometer, compounds which produce identical primary characteristic ions or positional and geometric isomers, can not be positively identified by this system (e.g., 1,1-dichloroethene and 1,2-dichloroethene) unless a characteristic secondary ion is available for monitoring. Compounds with higher molecular weights may produce the same fragment ions which will increase the signal of target analytes. A false positive result may occur when there are VOCs present in the sample which yield molecular ions or ion fragments with the same  $m/z$  (mass/charge) values as the characteristic ions of the target VOCs. Therefore, this detection system can only be used to detect or to confirm the presence of target analytes but not for the positive identification of unknown compounds.

Although the sensor provides a nearly linear numerical response over a dynamic range of approximately three orders of magnitude starting from a minimum detection capability as low as 10's of ppb (weight of VOC/weight soil), the certification is limited to a qualitative field screening method because the effectiveness of thermal desorption is very site specific, and may vary as a function of the soil type as well as the analytes being investigated. In addition, varying moisture contents or total organic carbon can produce matrix interferences.

Details of the analytical method for in-situ measurement of VOCs in soil with SCAPS TDS and ITMS are described in the document, "Direct Sampling Ion-Trap Mass Spectrometry for the Measurement of Volatile Organic Compounds in Water, Soil and Air," Draft EPA SW-846 Method 8265, 1997. The draft Method 8265 identifies 30 target analytes and their corresponding quantitation ions that can be analyzed by ITMS. This method was developed by Oak Ridge National Laboratory (ORNL) and field tested by the U.S. Army Corps of Engineers with a variety of direct sampling devices, including the SCAPS TDS. Based on this effort, U.S. EPA is now considering Method 8265-Volatiles by Direct Sampling Ion-

Trap Mass Spectrometry (ITMS) for inclusion in the Update IV B of EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846).

## **Basis for Certification**

The technology involves the application of accepted and well-documented scientific principles of thermal desorption, collection of VOCs with sorbent traps, and analysis of VOCs using ion-trap mass spectrometry. These principles upon which the technology is based were found to be sound.

The technology evaluation considered performance parameters, including sensitivity, specificity, precision, accuracy, and reliability. The evaluation focused on comparing the results obtained during field use of the technology with those obtained using accepted reference methods for subsurface soil sampling and laboratory analyses.

Summary results from previous field demonstrations and technology development efforts were reviewed. During the period from May 1995 through June 1996 field investigations had been conducted at Dover Air Force Base (AFB), Aberdeen Proving Grounds and Elgin AFB. These field studies involved more than 85 TDS discrete soil sample analyses taken from 32 CP push holes. For the certification evaluation the U.S. Army Engineer Research and Development Center, Waterways Experiment Station conducted field studies at four sites in different geographic areas with different site conditions and contaminant concentrations. Detailed QA/QC data packages were submitted for field studies completed at three of the sites: Hanover, Lake City and Longhorn. OPPTD staff were involved in the review of field demonstration plans prior to conducting the field work for the Davis Transmitter, Lake City and Longhorn sites. Only summary data was submitted for the field study completed at the Davis site because of data quality concerns with the non-commercial sorbent traps used in that study. OPPTD observed operations and technology validation procedures in the field during the demonstrations conducted at the Davis and Longhorn sites. For purposes of quality control OPPTD staff obtained duplicate confirmation samples from the Davis and Longhorn sites for analysis by the DTSC Hazardous Materials Laboratory.

The four studies involved a total of 29 cone penetrometer push holes which included 97 TDS in-situ discrete soil sample analyses and corresponding number of co-located confirmation samples collected and analyzed by the reference method. In addition, subsamples were obtained from each confirmation core sample and emplaced ex-situ into the TDS sample chamber for ITMS analysis. These latter samples were termed probe verification or PV samples and were used as a direct means to verify technology performance.

Six target analytes were investigated and detected in significant concentrations during the four field studies: tetrachloroethene (PCE), trichloroethene (TCE), total dichloroethene (DCE), vinyl chloride, toluene and ethylbenzene. For TCE and total DCE, approximately 60 TDS analyses spanning a range of concentrations were obtained and verified. There were 16 TDS analyses completed at the Lake City site which provided limited data on other analytes including PCE, vinyl chloride, toluene and ethyl benzene.

For QA/QC purposes, splits of selected verification samples were analyzed by an independent laboratory. DTSC Hazardous Materials Laboratory staff reviewed the data packages for the results of these quality control samples which were analyzed by PDP Analytical Services for the Hanover site, and Argus Analytical for the Lake City and Longhorn sites. Not all control limits were met for one of the Hanover site quality control (QC) samples (ID#72996) and holding times on the QC samples for the Longhorn site were not met. Results for QC samples for the Lake City site were found to be acceptable.

The performance of an analytical method is typically evaluated over a range of concentrations of two or more orders of magnitude. Based on EPA Method 8260A analyses, the maximum concentration encountered for any of the analytes was 131 µg/g for TCE at the Longhorn site. Except for TCE, the concentrations encountered during the field studies were relatively low. For vinyl chloride and DCE, concentrations ranged up to 2 µg/g and 9 µg/g respectively. For the other analytes, only low concentrations near the detection limits were encountered. Reported detection limits for all of the analytes were similar for both the TDS and reference EPA Method 8260A analyses, with median values ranging from about 0.1 to 0.3 µg/kg.

Since the SCAPS TDS is considered a field screening technology, performance was primarily evaluated in terms of the potential for false positive and false negative results. Occurrences of false positives and negatives, as well as confirmed positives and negatives, were determined based on results for the in-situ TDS analyses and ex-situ TDS PV sample analyses versus the analysis by reference method, EPA Method 8260. For field screening technologies, performance is generally considered acceptable if there are fewer than 5% false negatives and fewer than 5% false positives. Of particular concern is the occurrence of false negatives, that is the event of determining a sample is clean or uncontaminated when it is not.

For all of the analytes, there was a greater percentage of false positive and negative results for the in-situ TDS analyses than for the ex-situ PV sample analyses. This was an expected result due to soil contamination variability between the location of the in-situ TDS discrete sample and location of the verification sample obtained from a horizontally off-set push hole. Even given this problem there were only 3% false negatives and no false positives for TCE based on the in-situ TDS results. For DCE there were 6% false negatives and 6% false positives based on the in-situ TDS results which was only 1% higher than the generally accepted performance standard of 5% for field screening technologies. For both DCE and TCE, there were 2% or fewer false positive or false negative results based on the PV sample results, indicating an acceptable level of performance.

For vinyl chloride, there were 16 confirmed positive results for concentrations of up to 2 µg/g at the Lake City site. There were only several confirmed positive TDS results for low concentrations (< 0.4 mg/kg) of toluene and ethylbenzene at the Lake City site. These few confirmed positive results for toluene and ethylbenzene were not considered sufficient to adequately assess the performance of the technology for these analytes.

Data on PCE were collected from both the Lake City and Davis sites. However, for the Davis site a supporting data package was not provided, and only low concentrations (0.01 to 0.04 µg/g) of PCE were encountered that were less than the reported detection limits for any of the other sites. Because of this concern and data quality concerns with the use of non-commercial sorbent traps for the Davis site, these results were not considered in the certification evaluation.

Also analyzed were the pooled data for DCE from the Hanover, Longhorn and Lake City sites, and the pooled data for TCE from the Hanover and Longhorn sites. For these two analytes having the most performance data there appears to be a relatively good correlation between the TDS PV sample results and verification sample result ( $R^2=0.83$  for DCE;  $R^2=0.97$  for TCE). As expected, the correlations for the in-situ TDS analysis with verification sample results were less due to small-scale spatial variation in contamination levels encountered at the sites ( $R^2=0.54$  for DCE;  $R^2=0.85$  for TCE).

## Certification Statement

Under the authority of Health and Safety Code section 25200.1.5, the Site Characterization and Analysis Penetrometer System Thermal Desorption Sampler (SCAPS TDS) is hereby certified as a hazardous waste **Site Characterization** technology subject to the specific conditions including the limitations/disclaimer set forth in the Certification Notice as published in the California Regulatory Notice Register on [month, day, year], Register No. [xx], Volume No. [xx-Z], pages [xxxx - xxxx]. The SCAPS TDS is certified as a near real-time in-situ subsurface screening method for volatile organic compounds (VOCs). This certification is specific to the use of the SCAPS TDS technology in the vadose or capillary zone as a qualitative to semi-quantitative field screening method for trichloroethene (TCE) or total dichloroethene (DCE) contamination. The technology has applicability to other VOCs which can be detected with an ion-trap mass spectrometer (ITMS), provided these compounds can be effectively desorbed from the soil matrix with SCAPS TDS. As a field screening method, it is not a replacement for soil sampling borings, but is a means to further delineate the distribution of subsurface contamination and to reduce the time to fully characterize a site. Field studies for total DCE and TCE demonstrated that the SCAPS TDS technology achieved less than 5% false negative results and less than 5% false positive results when compared to verification core samples analyzed by EPA Method 8260A, the reference method. Detection thresholds for TCE and total DCE achieved in field studies using SCAPS TDS are comparable to those of the reference method. SCAPS TDS has applicability to field screening for the presence of known contaminants, but not for the identification of an unknown substance unless the ions detected are uniquely characteristic to those substances. Isomers such as 1,1-DCE and 1,2-DCE or other compounds which produce the same quantitation mass ions cannot be distinguished from each other with this method. False positive or high results may occur when there are VOCs present in the sample which yield molecular ions or ion fragments with the same m/z values as the characteristic ions of the target VOCs.

## Limitations of Certification

DTSC makes no express or implied warranties as to the performance of the SCAPS Thermal Desorption Sampler. Nor does DTSC warrant that the SCAPS Thermal Desorption Sampler is free from any defects in workmanship or materials caused by negligence, misuse, accident or other causes. However, DTSC believes that the SCAPS Thermal Desorption Sampler can be used in accordance with the conditions specified in this certification notice to achieve the results specified herein.

Use of the certified technology is limited to field screening for detection or confirmation of target analytes, but not for positive identification of analytes. Since the ITMS does not have a separation mechanism other than the mass spectrometer, compounds which produce identical primary characteristic ions or positional and geometric isomers, cannot be positively identified by this system (e.g., 1,1-dichloroethene and 1,2-dichloroethene) unless a characteristic secondary ion is available for monitoring. Compounds with higher molecular weights may produce the same fragment ions which will increase the signal of target analytes. A false positive result may occur when there are VOCs present in the sample which yield molecular ions or ion fragments with the same m/z values as the characteristic ions of the target VOCs.

## Specific Conditions

1. This certification is limited to use of the SCAPS Thermal Desorption Sampler for in-situ analyses of trichloroethene (TCE) or total dichloroethene (DCE) contamination. The technology may also be applied to analysis of other chlorinated solvent compounds listed as target analytes in draft Method 8265, provided it can be demonstrated with confirmation sample analyses that these compounds are effectively desorbed from the soil matrix being investigated.
2. This certification is limited to use of the SCAPS Thermal Desorption Sampler in the vadose or capillary zones.
3. The SCAPS Thermal Desorption Sampler shall be operated in accordance with specific procedures developed by the U.S. Army Engineer Research and Development Center, Waterways Experiment Station and described in the following two documents: (a) Draft Method 8265, Direct Sampling Ion-Trap Mass Spectrometry for the Measurement of Volatile Organic Compounds In Water, Soil, and Air, SW-846 Organic Methods Workgroup, Revision WG 2, July 1997. and (b) Tri-Service Site Characterization and Analysis Penetrometer System (SCAPS) Validation of the Thermal Desorption Sampler for Volatile Organic Compounds, Instruction Report, U.S. Army Engineer Research and Development Center, Environmental Laboratory, Vicksburg, MS in press December 1999, Myers, K.F., Karn, R.A., Eng, D.Y., Konecny, K.F., Davis, W.M. U.S. EPA is considering Method 8265-Volatiles by Direct Sampling Ion-Trap Mass Spectrometry (ITMS) for inclusion in the Update IV B of EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846). The final version of Method 8265 accepted into SW-846, or any revisions made to the draft method as part of the SW-846 acceptance process, shall supercede the draft method referenced above.
4. Confirmation Samples. Laboratory analyses of discrete depth core samples by Method 8260 or equivalent **are required** for positive identification of the specific contaminants present at the site. This requirement is necessary because different compounds may produce the same characteristic ions which are detected and quantified by the ITMS. Thus, the certified technology is only able to detect or confirm the presence of known specific contaminants. In addition, matrix effects, and even the particular contaminant or contaminants present, may vary with depth and stratigraphy. It is recommended that discrete core samples for reference method analysis be taken at several or more representative locations that are co-located with SCAPS TDS analyses. Discrete core samples may be obtained with a core sampler used in conjunction with a cone-penetrometer, or by conventional soil sample borings. Small or simple sites may require fewer confirmation samples than larger, more complex sites. The depth, size, stratigraphy, and contamination profile of a site should all be considered in a site-specific sampling plan for determining the necessary number and locations of confirmation samples. Site characterization data obtained during prior investigations may also be considered for this requirement.
6. Push Hole Abandonment. The user shall comply with all applicable state and local regulations regarding the proper abandonment of cone penetrometer pushholes (i.e. well abandonment requirements). At a minimum, each SCAPS TDS push hole shall be immediately grouted upon



removal of the push rod string to prevent contaminant migration along this potential pathway. A tremie pipe shall be used to grout the SCAPS TDS push hole from the bottom up, using a cement bentonite slurry. The specific grout mixture used should be documented at each site so future investigations or monitoring programs can anticipate the potential for detecting low concentrations of any additives and possible breakdown products. Additionally, water used in the grout mixture and in the grouting process should be a water of known and documented quality.

7. Probe Cleaning. The steam cleaning system integral to the truck should be used to automatically steam clean the penetrometer rod sections as they are being withdrawn from the push hole and prior to being handled by the field crew and placed onto the storage racks. Spent water from the cleaning process, directed to a storage drum, should be properly classified and managed.
8. Compliance with Worker Health and Safety Laws. Operation of the SCAPS Thermal Desorption Sampler must be in compliance with all federal, state and local regulations relating to the protection of worker health and safety. In California these include, but are not limited, to Cal-OSHA and OSHA requirements.
9. Personnel Training. The operator shall be properly trained on how to safely and effectively operate and maintain all components of the SCAPS TDS system, including the cone penetrometer platform, the Thermal Desorption Probe and associated sample collection equipment, and the ITMS analytical instrument..
10. Compliance with Applicable Federal, State, Local Regulations. The user shall comply with all applicable federal, state, and local regulatory requirements.
11. Modifications and Amendments at the Request of the Applicant. Modifications and amendments to this certification may be requested by the applicant and will be subject to approval by DTSC.
12. Certification Reference. The holder of a valid hazardous waste environmental technology certification is authorized to use the certification seal (California Registered Service Mark Number 046720) and shall cite the certification number and date of issuance in conjunction with the certification seal whenever it is used. When providing information on the certification to the user of the technology or another interested party, the holder of a hazardous waste environmental technology certification shall at a minimum provide the full text of the final certification decision as published in the California Regulatory Notice Register.
13. The user of the certified technology shall maintain adequate records to document compliance with the conditions of certification. The records shall be maintained onsite and available for inspection.

## **Regulatory Implications**

This certification is for the specific claims, conditions, and limitations outlined in this notice, and is based on DTSC's evaluation of the technology's performance. The Certification does not change the regulatory status of SCAPS TDS technology; it should, however, facilitate and encourage the acceptance of this technology as a field screening method for site characterization, thereby reducing the required number of soil sampling borings, as well as the overall time and effort, required to fully characterize a site.

Use of this technology as a field screening method for site characterization does not require a hazardous waste management permit issued by DTSC. However use of the technology may be subject to regulation by other state and local agencies. For each specific application, the end-user must ensure compliance with all applicable regulations and standards established by other state and local agencies.

This Certification is issued under the California Environmental Technology Certification Program, and is therefore subject to the conditions set out in the regulations, such as the duration of the Certification, the continued monitoring and oversight requirements, and the procedures for certification amendments, including decertification.

By accepting this Certification, the manufacturer assumes, for the duration of the Certification, responsibility for maintaining the quality of the manufactured materials and equipment at a level equal or better than was provided to obtain this Certification and agrees to be subject to quality monitoring by DTSC as required by the law, under which this Certification is granted.

## **Duration of Certification**

This certification will remain in effect for three years from the date of issuance, unless it is amended or revoked for cause.